



US Army Corps  
of Engineers  
Detroit District

# Great Lakes Update

## Lake Winnebago – An Important Great Lake Resource

Lake Winnebago lies within the largest drainage basin to Lake Michigan and the third largest to the Great Lakes. The lake is part of the Fox-Wolf River Basin, which includes the Upper Fox River, the Wolf River and the Lower Fox River. The Fox-Wolf River Basin has an area of 6,400 square miles. The U.S. Army Corps of Engineers regulates the water levels of Lake Winnebago at the Menasha and Neenah dams at the northern end of the lake.

Lake Winnebago is the second largest freshwater lake within any state in the United States (second to Lake Okeechobee in Florida). The lake is about 28 miles (45 km) long and 10 miles (16 km) wide.

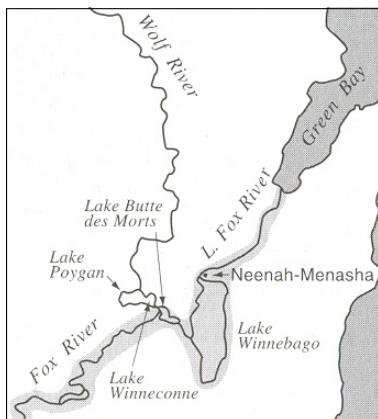


Figure 1. The Fox-Wolf River Basin

The Wolf, Upper Fox, and Lower Fox Rivers, along with Lake Winnebago and the other upper pool lakes, serve as vitally important water resources to the region. They are used for a large variety of commercial, industrial, municipal, and recreational purposes. For example, pulp and paper industry facilities line the shores of the Lower Fox River. These industries use the river for their process and cooling water supply.



Figure 2. Paper Mill on the Fox River

Hydroelectric power generation is another key industry in the Fox-Wolf basin. The Fox-Wolf River basin is also used by public water utilities and local governments for domestic water supplies and for services such as fire-fighting and street washing. Lake Winnebago also provides drinking water to the communities of Appleton, Oshkosh, Neenah, and Menasha.

Recreational activities such as boating, fishing, and hunting, are becoming increasingly popular. Lake Winnebago, with its many access and launch facilities, is a popular destination for those looking to fish, pleasure boat, and water ski. These activities are making increasing demands on the region's lakes and rivers.



Figure 3. Sailing on Lake Winnebago

Each group – municipalities, public utilities, waste treatment plants, industries, and recreational users – who use Lake Winnebago and the surrounding waterways have a stake in the quantity and quality of the water resource. Often, one group's desires for specific water level and discharge operations are in conflict with another group's needs. For example, recreational users want to maintain higher water levels in Lake Winnebago for boating, fishing, sailing and water skiing, whereas higher water levels in the early spring can cause serious environmental damage to sensitive aquatic vegetation.

### History of Winnebago Water Management

In the 1850s, Lake Winnebago became part of an important commercial navigation system that connected Green Bay with the Mississippi River. To facilitate navigation, dams were built on the Fox River at Neenah and Menasha, creating Lake Winnebago and the upper pool lakes of Lakes Poygan, Winneconne, and Butte des Morts. A system of locks and dams was also constructed along the lower Fox River to make navigation

through the lower Fox River to Green Bay possible.

The construction of dams on the Lower Fox River spurred the development of hydroelectric power generation at many of these dams, as well as the establishment of industries such as paper milling along the river.



Figure 4. Hydroelectric power plant on Fox River at Appleton, WI in the 1800s

Prior to construction of the Neenah and Menasha dams, this area consisted of naturally eutrophic, large riverine marshes. Fish and wildlife thrived in the optimal conditions offered in the marshes.

The Neenah and Menasha dams transformed the riverine marsh environment to a large, open-water lake system, producing a two-foot increase in water levels. This transition, which brought turbid water and fluctuating water levels to the newly created lakes, decreased aquatic species composition and abundance.

These changes transformed the Lake Winnebago region from a marsh ecosystem to a turbid, open-water system. According to the Wisconsin Department of Natural Resources (WDNR), thousands of acres of aquatic and meadow vegetation have disappeared from the Upper Winnebago Pool Lakes of Poygan, Winneconne, and Butte des Morts since impoundment in the 1850s.

### Current Regulation Strategy

The U.S. Army Corps of Engineers, Detroit District regulates Lake Winnebago water levels on a daily basis, attempting to balance the needs of all competing uses of the basin's water resources. This is accomplished through frequent coordination, discussion and correspondence with the user communities and conducting an annual regulation meeting that is open to the public.

An important objective of lake operations is to reduce downstream flooding during spring snowmelt and floods. The lake is drawn down in the winter in anticipation of spring rains and snowmelt. The lake's storage capacity allows it to be used to reduce the incidence of downstream floods. After the threat of spring flooding has passed, the lake level is raised to its summer target for navigation and recreational boating.

Springtime high water levels can damage sensitive aquatic vegetation. The Corps has been working with the WDNR the last several years to reduce the likelihood of excessively high water levels in the spring. This year, the Corps maintained a lower water level in April in an attempt to avoid damaging high water levels from heavy rains.

However, extremely heavy precipitation in May and June sent water levels much higher than the target level. Establishing a relatively low target level in the early spring period is still considered critical in preventing flooding and damage to the sensitive aquatic vegetation.

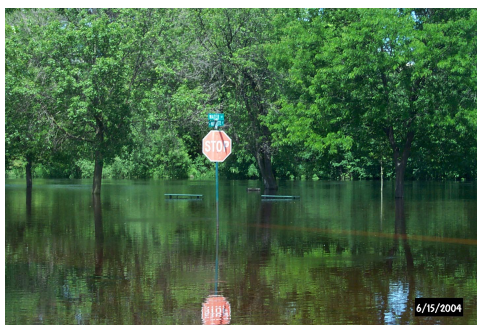


Figure 5. Flooding at Berlin, Wisconsin in June 2004

Preventing and/or minimizing the effects of flooding, and preserving and enhancing fish, wildlife, wetland habitat, and water quality in the Lower Fox River and the Lake Winnebago pool are chief objectives of the Army Corps' water level management plan. Since the early 1980s, the Army Corps has implemented a regulation plan that contains different target water levels, depending on the time of year.

In the winter after a solid ice cover forms in the upper reaches of the Lake Winnebago pool, the Corps of Engineers begins a slow drawdown. The drawdown provides storage needed to contain spring flooding. For the sake of the aquatic and semi-aquatic animals that occupy the shallow-water zone during the fall and winter, the water level is not drawn down before a solid ice cover develops.

Once the drawdown target is achieved, the stage is held constant until the ice cover in the Lake Winnebago pool breaks up and starts moving out.

Spring refill of the Winnebago pool begins when the ice cover moves out. The pool is refilled to achieve the target navigation level in late spring. In recent years, the spring refill has been accomplished in a more gradual manner to avoid excessively high levels that can cause serious environmental damage to aquatic plants.

The level of Lake Winnebago is held as close as possible to the target stage during the remainder of the navigation season. Depending on weather conditions throughout the summer, the stage may fall three or four tenths of a foot below the target by fall due to evaporation. When navigation season ends, the lake is drawn down again, aiming for a level of about 2.5 feet Oshkosh datum by mid-October.

The Army Corps of Engineers works closely with the WDNR, wastewater regulators, hydroelectric users, and other groups to establish specific regulation strategies and to facilitate cooperation between the various users of the basin's water resources.

The Corps of Engineers hosts an annual regulation meeting to discuss the past year's operations and to receive comments on the upcoming year's regulation strategy. The 2004 Regulation Strategy meeting will be held on October 20, 2004 at 9:00 a.m. at the J a Restaurant in Appleton, Wisconsin. The public is invited to attend. For more information, visit [www.lre.usace.army.mil/glhh/winnebago](http://www.lre.usace.army.mil/glhh/winnebago).

### FOX RIVER LOCK TRANSFER

In the mid-1800s, an important commercial navigation route was established between Green Bay and the Mississippi River. A series of 17 locks were constructed on the Lower Fox River between 1848 and 1869 to facilitate navigation through the lower Fox River.

By the 1940s, however, commercial traffic along that route had virtually ceased due to the advent of railroad and highways. In 1983, the Corps of Engineers discontinued its operation and maintenance of the locks of the Lower Fox River and placed its property holdings in caretaker status.

Despite the lack of commercial navigation and thus lack of federal interest in the locks, the Fox River lock system was regarded as an important part of the heritage of Northeastern Wisconsin and a part of a great natural resource.

Beginning in the mid-1980s, an effort was begun to transfer ownership of the locks from the Corps of Engineers to the state of Wisconsin. The 22-year community-based effort was finally accomplished on September 17, 2004 when Governor Jim Doyle officially accepted state ownership of the 17 lower Fox River locks from the Corps of Engineers in a ceremony in Appleton, Wisconsin.

The State is planning a public and private effort that would eventually renovate and reopen all but one of the locks, allowing commercial and recreational boats to travel from Green Bay to Lake Winnebago.

The Fox River Navigational System Authority, an organization created by the State of Wisconsin in 2001, will assume responsibility for the rehabilitation, repair, replacement, operation, and maintenance of the Fox River Navigational System. The conditions of the transfer of the lock system to the Authority included the provision of an \$11.8 million lump sum payment and 94 acres of federal land adjacent to the Lower Fox River.

Today, three of the 17 locks are currently operational. A fourth lock, the Rapide Croche lock at Wrightstown, will remain permanently sealed to prevent sea lamprey and other invasive species from migrating upstream into Lake Winnebago and the upper pool lakes.



Figure 6. Lock on the Lower Fox River at Rapide Croche

The Fox River Navigational System Authority estimates that it could take three to five years before another lock is restored and operational. The planners for the locks and the surrounding land also envision the creation of campgrounds, bike trails, and automobile routes along the river near the locks. The Fox River locks revitalization is widely viewed as a positive effort to increase tourism in the Lake Winnebago region and to enhance the historical significance of the area.

Although ownership of the locks has been turned over to the State of Wisconsin, the Corps of Engineers will continue to operate the dams on the Fox River as part of its flood control responsibilities.